

Amendments to the Claims

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1. to 32. (Cancelled)

33. (Currently Amended) A method for extracting one or both of phosphorus and nitrogen from wastewater, the method comprising:

introducing the wastewater into a column comprising a substantially vertically oriented conduit having a harvesting section and at least two vertically sequential sections above the harvesting section, wherein a cross sectional area of the conduit increases between adjacent ones of the sections;

maintaining supersaturation conditions for struvite, a struvite analog, or a phosphate compound in the harvesting section;

recycling wastewater which has passed through the column while controlling a supersaturation ratio of struvite, a struvite analog, or a phosphate compound in the harvesting section to have a value within a desired range, wherein controlling the supersaturation ratio is performed at least in part by controlling a recycling ratio of a rate at which wastewater is recycled into the column to a total rate at which wastewater is being introduced into the column; and,

extracting from the harvesting section pellets formed within the column.

34. (Original) A method according to claim 33 wherein the cross sectional area of the conduit increases stepwise between adjacent ones of the sections.
35. (Original) A method according to claim 34 wherein the cross sectional area of the conduit increases stepwise by a factor of at least 1½ between the adjacent ones of the sections.
36. (Original) A method according to claim 33 wherein maintaining supersaturation conditions comprises maintaining a supersaturation ratio in the range of 2 to 5 within the harvesting section.
37. (Original) A method according to claim 36 wherein maintaining supersaturation conditions comprises maintaining a pH in the range of 7.4 to 8.5 within the harvesting section.
38. (Original) A method according to claim 36 wherein maintaining supersaturation conditions comprises maintaining a pH not exceeding 8 in the harvesting section.
39. (Original) A method according to claim 33 wherein maintaining supersaturation conditions comprises maintaining a supersaturation ratio in the range of 3 to 4 within the harvesting section.
40. (Original) A method according to claim 33 wherein the pellets comprise pellets of struvite.
41. (Original) A method according to claim 33 wherein the pellets comprise pellets of a struvite analog.

42. (Original) A method according to claim 41 wherein the struvite analog is potassium magnesium phosphate.
43. (Original) A method according to claim 33 wherein maintaining supersaturation conditions comprises controllably introducing a cation solution into the column.
44. (Original) A method according to claim 43 wherein the cation solution comprises magnesium ions.
45. (Original) A method according to claim 33 comprising maintaining concentrations of magnesium and ammonia higher than a concentration of phosphate within the harvesting section.
46. (Original) A method according to claim 33 comprising maintaining concentrations of magnesium and phosphate higher than a concentration of ammonia within the harvesting section.
47. (Original) A method according to claim 45 comprising adding a ammonia solution to the column.
48. (Original) A method according to claim 35 comprising maintaining an average upward flow velocity of at least 400 cm/min within the harvesting section.
49. (Original) A method according to claim 48 comprising maintaining an average upward flow velocity not exceeding 75 cm/min within an uppermost one of the sections.
50. (Original) A method according to claim 48 comprising maintaining a ratio of the average upward flow velocity in

the harvesting section to the average upward flow velocity in the uppermost section to be at least 10:1.

51. (Original) A method according to claim 50 comprising maintaining the ratio of the average upward flow velocity in the harvesting section to the average upward flow velocity in the uppermost section to be at least 20:1.
52. (Original) A method according to claim 33 comprising maintaining an average upward flow velocity of at least 400 cm/min within the harvesting section.
53. (Original) A method according to claim 52 comprising maintaining an average upward flow velocity not exceeding 75 cm/min within an uppermost one of the sections.
54. (Original) A method according to claim 53 comprising maintaining a ratio of the average upward flow velocity in the harvesting section to the average upward flow velocity in the uppermost section to be at least 10:1.
55. (Currently Amended) A method according to claim 35 wherein recycling wastewater which has passed through the column comprises passing the wastewater through a clarifier before reintroducing mixing the wastewater with incoming wastewater and introducing the mixture of recycled and incoming wastewater into the column.
56. (Currently Amended) A method according to claim 33 wherein recycling wastewater which has passed through the column comprises passing the wastewater through an air stripper before reintroducing mixing the wastewater with incoming

wastewater and introducing the mixture of recycled and
incoming wastewater into the column.

57. (Original) A method according to claim 33 wherein extracting from the harvesting section pellets formed within the column comprises extracting the pellets at a rate such that a crystal retention time of pellets in the column is at least one week.
58. (Original) A method according to claim 33 wherein extracting from the harvesting section pellets formed within the column comprises extracting the pellets at a rate such that a crystal retention time of pellets in the column is at least four days.
59. (Original) A method according to claim 33 wherein extracting from the harvesting section pellets formed within the column comprises extracting the pellets at a rate such that a crystal retention time of pellets in the column is in the range of 8 to 12 days.
60. (Currently Amended) A method for extracting one or both of phosphorus and nitrogen from wastewater, the method comprising:
 - maintaining supersaturation conditions for a solid reaction product in a substantially vertically oriented column;
 - introducing the wastewater into the column and allowing particles of the reaction product to form in the column;
 - maintaining the particles of the reaction product in a fluidized bed within the column, the fluidized bed spanning at least three vertically sequential zones within the column, wherein wastewater within each of the zones has a

different average upward fluid velocity and the average upward fluid velocity is less in vertically higher ones of the zones than in vertically lower ones of the zones;

allowing particles to grow to a size sufficient to migrate downward to a harvesting zone comprising at least a portion of a lowermost one of the at least three zones; and,

harvesting particles from the harvesting zone

wherein maintaining the supersaturation conditions for the solid reaction product in the column comprises recycling wastewater which has passed through the column while controlling a supersaturation ratio of the solid reaction product in a lowermost one of the zones to have a value within a desired range, wherein controlling the supersaturation ratio is performed at least in part by controlling a recycling ratio of a rate at which wastewater is recycled into the column to a total rate at which wastewater is being introduced into the column.

61. (Original) A method according to claim 60 wherein the reaction product comprises struvite.
62. (Original) A method according to claim 60 wherein the reaction product comprises a struvite analog.
63. (Original) A method according to claim 62 wherein the struvite analog is potassium magnesium phosphate.
64. (Original) A method according to claim 60 comprising maintaining an average upward flow velocity of at least 400 cm/min within the harvesting zone.

65. (Original) A method according to claim 64 comprising maintaining an average upward flow velocity not exceeding 75 cm/min within an uppermost one of the zones.
66. (Original) A method according to claim 65 comprising maintaining a ratio of the average upward flow velocity in the harvesting zone to the average upward flow velocity in the uppermost zone to be at least 10:1.
67. (Original) A method according to claim 65 comprising maintaining the ratio of the average upward flow velocity in the harvesting zone to the average upward flow velocity in the uppermost zone to be at least 20:1.
68. (New) A method according to claim 60 comprising controlling the supersaturation ratio to have a value between 2 and 5.
69. (New) A method according to claim 60 comprising controlling the supersaturation ratio to have a value between 3 and 4.
70. (New) A method according to claim 60 wherein recycling wastewater which has passed through the column comprises passing the wastewater being recycled through a clarifier.
71. (New) A method according to claim 60 wherein recycling wastewater which has passed through the column comprises raising a pH of the wastewater being recycled by passing the wastewater being recycled through a stripper.
72. (New) A method according to claim 60 wherein harvesting the particles comprises extracting the particles at a rate such that a crystal retention time of particles in the column is at least one week.